April 15, 1930. J. O. JOHNSON 1,754,322

SNOWPLOW WITH TOP DISCHARGE

Filed July 6, 1926 3 Sheets-Sheet 1

Fig. 1.

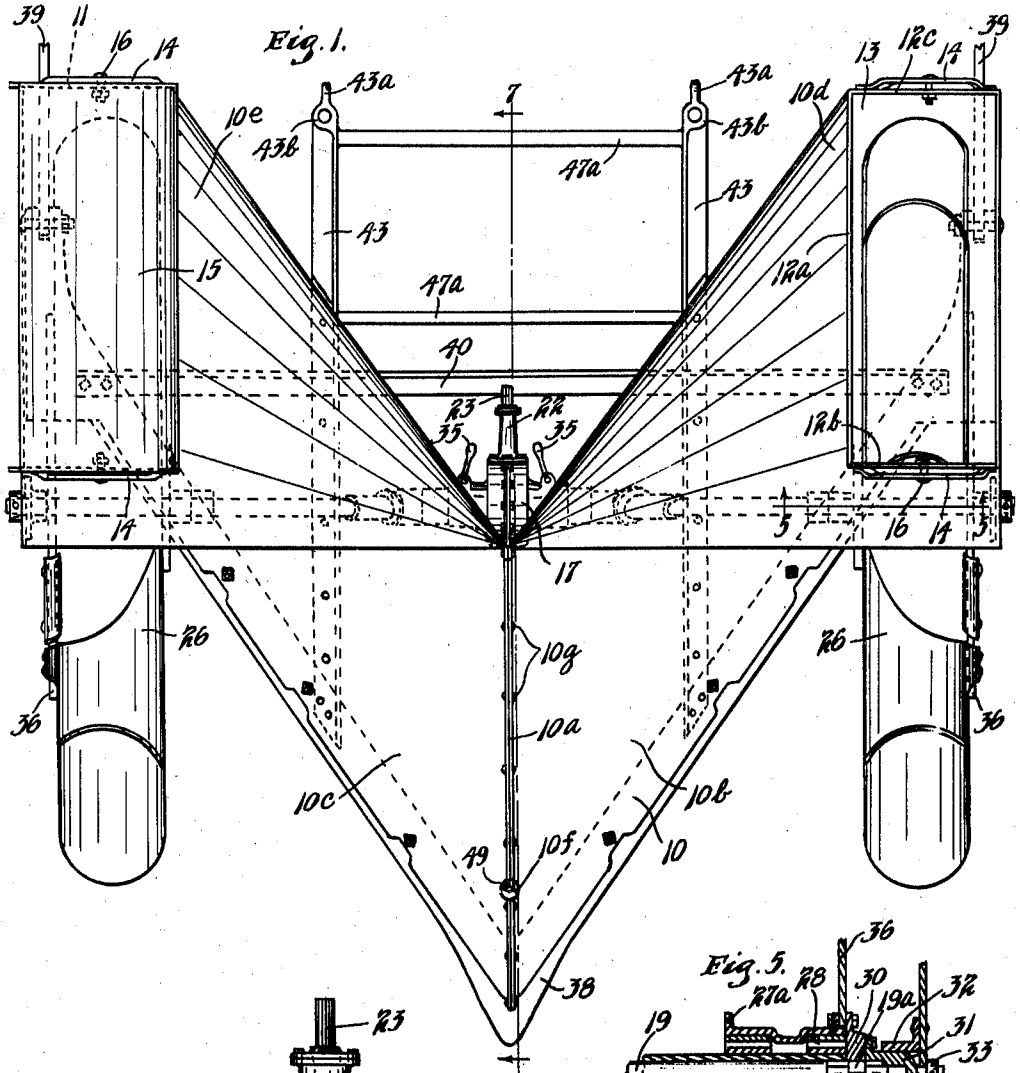


Fig. 5.

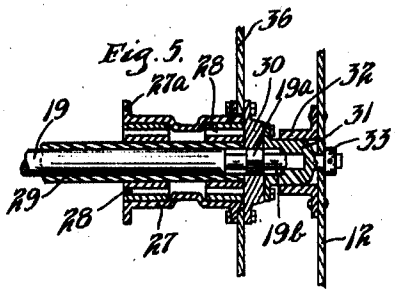
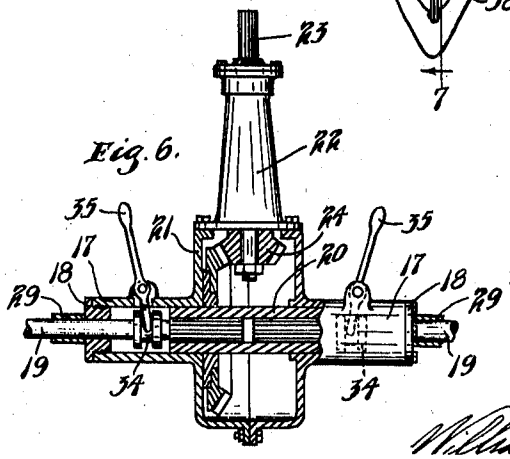


Fig. 6.



INVENTOR.
JOHN O. JOHNSON.
BY HIS ATTORNEYS.

Williamson Keefe & Williamson

April 15, 1930. J. O. JOHNSON 1,754,322

SNOWPLOW WITH TOP DISCHARGE

Filed July 6, 1926 3 Sheets-Sheet 2

Fig. 3.

Fig. 2.

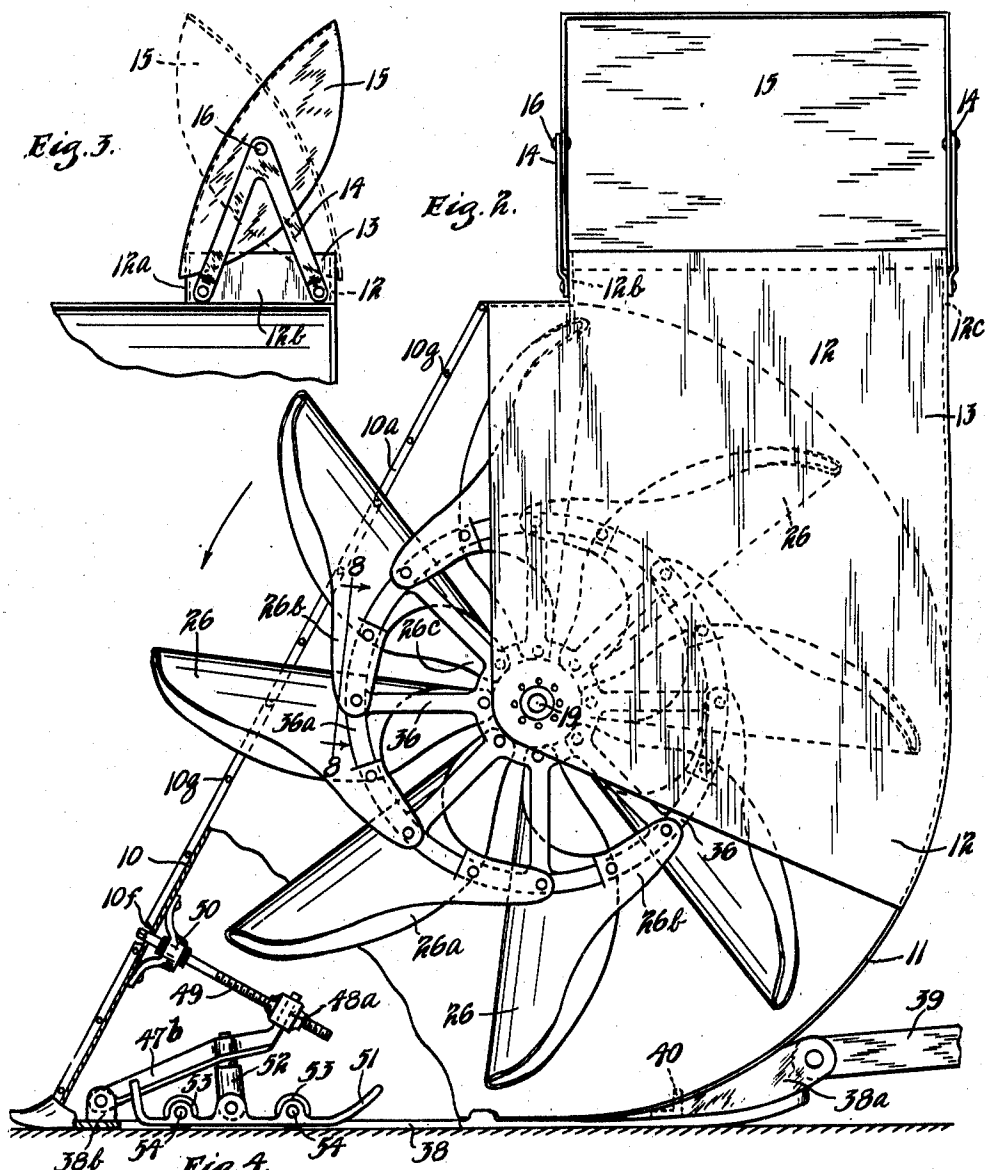
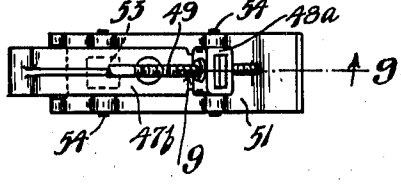


Fig. 4.



INVENTOR.
JOHN O. JOHNSON.
BY HIS ATTORNEYS.

Williamson Perkins & Williamson

April 15, 1930. J. O. JOHNSON 1,754,322

SNOWPLOW WITH TOP DISCHARGE

Filed July 6, 1926 3 Sheets-Sheet 3

Fig. 9.

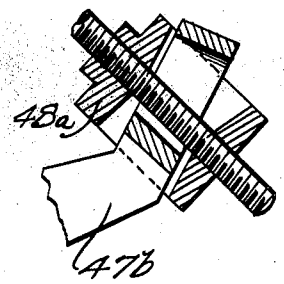


Fig. 7.

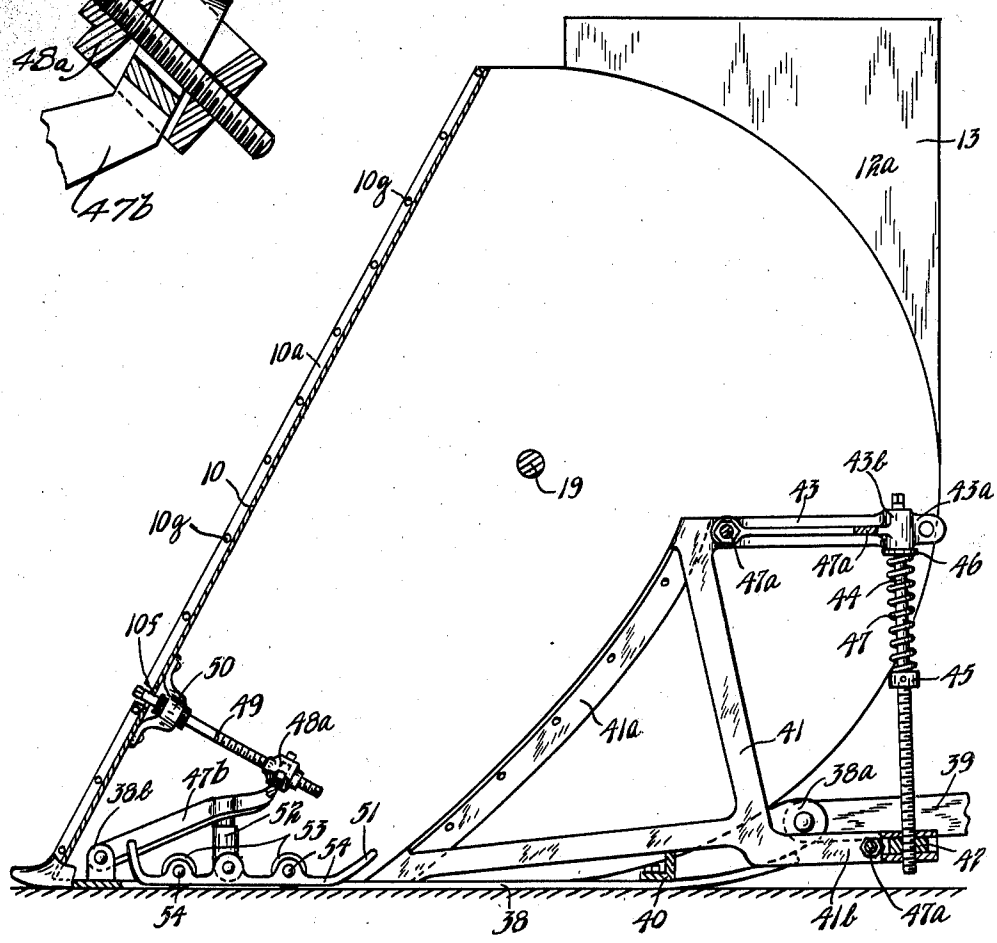
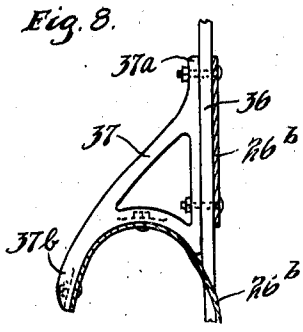


Fig. 8.



INVENTOR.
JOHN O. JOHNSON.
BY HIS ATTORNEYS.

Williamson Reis & Williamson

Patented Apr. 15, 1930 1,754,322

UNITED STATES PATENT OFFICE

JOHN O. JOHNSON, OF MINNEAPOLIS, MINNESOTA, ASSIGNOR, BY MESNE ASSIGNMENTS, TO ENTERPRISE HOLDING COMPANY, OF MINNEAPOLIS, MINNESOTA, A CORPORATION OF MINNESOTA

SNOWPLOW WITH TOP DISCHARGE

Application filed July 6, 1926. Serial No. 120,603.

This invention relates to a snow plow, and particularly to a snow plow adapted to clear highways.

It is an object of this invention to provide a snow plow having a front central prow portion and laterally and rearwardly extending mold boards leading to semi-cylindrical chambers in which are disposed rotating means adapted to receive and propel the snow upwardly through conduits leading upward from said chambers.

It is a further object of the invention to provide a snow plow such as set forth in the preceding paragraph, together with means at the top of said conduits adapted to direct the snow propelled therefrom in different directions, as to either side of the roadway or plow.

It is another object of the invention to provide a simple and efficient structure of rotary snow propelling means.

It is still another object of the invention to provide a snow plow having mold boards and rotary snow propelling means adjacent thereto, together with a driving means for said propelling means adapted to be connected to and driven from the motor shaft of an automobile, said plow being provided with driving shafts for said propelling means and controlling devices by means of which said driving shafts may be connected or disconnected to said propelling means to throw the same into or out of operation.

It is still a further object of the invention to provide a frame for said plow adapted to be connected to pushing members for moving the plow and arranged to tilt the plow and to absorb some of the vibration thereof.

It is still another object of the invention to provide a simple and efficient means for adjusting the front portion of the plow.

These and other objects and advantages of the invention will be fully set forth in the following description made in connection with the accompanying drawings, in which like reference characters refer to similar parts throughout the several views and in which:—

Fig. 1 is a stop plan view of the plow;

Fig. 2 is a view in side elevation thereof, some parts being broken away and others shown in vertical section;

Fig. 3 is a partial view in front elevation of the plow as seen from the left of Fig. 2;

Fig. 4 is a plan view of a portion of the elevating mechanism for the front of the plow;

Fig. 5 is a vertical section taken substantially on line 5—5 of Fig. 1, as indicated by the arrows;

Fig. 6 is a view partly in plan and partly in horizontal section of the central portion of Fig. 1, shown on an enlarged scale; and

Fig. 7 is a vertical section taken substantially on line 7—7 of Fig. 1.

Fig. 8 is a horizontal section taken on line 8—8 of Fig. 2, as indicated by the arrow; and Fig. 9 is a vertical section taken on the line 9—9 of Fig. 4, as indicated by the arrow.

Referring to the drawings, the plow comprises a prow portion 10 and in the embodiment of the invention illustrated, this prow portion is formed by a pair of plates having rectilinear edges 10^a bent into vertical planes and secured by a plurality of rivets 10^E, said edges extending upwardly and rearwardly in an inclined direction. Said plates, which are designated as 10^b and 10^c, form mold boards which extend rearwardly and laterally from the said front edges 10^a and are curved into partial cylindrical or conical form and have their outer edges 10^d and 10^e respectively substantially semi-circular in shape and disposed in vertical planes. As shown in Figs. 2 and 7, the edges 10^a extend in a straight line from the lower front portion of the plow to the top thereof, and the edges 10^d and 10^e extend approximately throughout a half circle or slightly more than a half circle. A semi-cylindrical plate 11 has one edge alined with the outer edges of each of the edges 10^d and 10^e and each of said plates 11 has an outer plate 12 extending partially therearound in a vertical plane. There are thus two substantially semi-cylindrical chambers at each side of the plow outwardly of the mold boards which are closed by the plates 12 at their outer sides. The plate 12 extends upwardly above the plates 11 with vertical front and rear edges and forms the outer

side of a rectangular chute 13 disposed directly over said plates 11 and said semi-cylindrical chambers, the inner side of which is formed by the plate 12^a and the front and rear sides by the plates 12^b and 12^c respectively. Triangular brackets 14 are secured at each end of the chute 13 to the plates 12^b and 12^c respectively and snow deflecting members 15 are pivoted to the upper ends of said brackets 14 on the pivots 16 having a common horizontal axis. The members 15 have curved semi-cylindrical top portions and segmental shaped side portions and their ends are adapted to overlap the sides of the chute 13 as shown in Fig. 3.

The mold board plates 10^b and 10^c have extending therethrough and supported therein casings 17 having end closing members 18 forming bearings for shafts 19. A sleeve 20 extends between and is journaled in the casings 17 and is splined to receive the inner ends of the shafts 19 which are provided with a plurality of keys fitting in the splines in said sleeve. The sleeve 20 has a gear 21 secured thereto by which it is driven, the sleeve thus driving the shafts 19. A casing 22 is secured to the rear side of the casings 17 and forms the bearing for a shaft 23 having its rear end provided with a plurality of keys, which end is adapted to be connected by suitable coupling and universal joint to the motor shaft of the propelling automobile. The shaft 23 has a pinion 24 secured to its inner end and disposed in the casings 17 meshing with gear 21 and adapted to drive the same. The shafts 19 at their outer ends have secured thereto rotary snow propelling members 26. While these members may be variously constructed, in the embodiment of the invention illustrated, each member is shown as comprising a hub casting 27 having circular flanges 27^a at each end and provided with suitable anti-friction bearings 28 adjacent each end forming the bearings for a sleeve bearing 29 which encloses the shaft 19. A driving member 30 is secured to one end of the hub 27 having an angular socket or opening at its center in which an angular portion 19^a of shaft 19 is adapted to fit, the shaft 19 having a cylindrical portion 19^b beyond the portion 19^a slidable in a cylindrical bore in a cap member 31 secured to the outer side of the member 30, which member 31 has a cylindrical exterior surface fitting in and running in a bearing 32 secured to the inner side of the plate 12. Member 31 also has a small cylindrical projection at its outer end extending through an aperture in plate 12 and having a small collar 33 pinned thereto. The shafts 19 each have secured thereto in the casing 17 clutch collars 34 and a pair of clutch levers 35 are pivoted in bosses on the members 17 and extend through openings in the members 17 having forked inner ends engaging the collars 34. The levers 35 have operating handles projecting rearwardly. The hub 27 has secured to the flange at its outer end a spider member 36 having an outer circular flange 36^a. A series of plates 26^a are secured to the flange 36^a and to the flange 27^a at the inner side of the hub member 27. The plates 26^a are bent to be of trough shape as shown in Fig. 2 with their greatest width adjacent the flange 36^a, the said plates tapering in width toward their outer ends so as to be substantially scoop-shaped. At their outer sides the plates 26^a have end portions or lugs 26^b extending to the outer side of the flange 36^a bolted or riveted thereto and at their inner sides the plates have end portions or lugs 26^c extending inwardly to and bolted or riveted to the inner flange 27^a as shown in Fig. 2. A bracket 37 is provided having an arcuate flange 37^a fitting the inner side of the flange 36^a and secured thereto by the same bolts securing the lug 26^b. The bracket extends inwardly around the rear of the blade or plate 26^a and has a lug 37^b at its inner end by which it is also secured to said plate. The plates 26^a are thus effectively braced by the brackets 37.

The plates 10^b and 10^c are supported upon and secured at their lower edges to a shoe 38 having a shoulder formed thereon against which the edges of said plate abut, member 38 extending laterally and rearwardly with the edges of the plates 10^b and 10^c and extending under the plates 11, the rear end of member 38 being formed with apertured lugs 38^a to which the push members 39 are secured. The members 39 will be attached at their other ends in some suitable manner to an automobile truck or tractor adapted to push the plow. The members 38^a have secured thereto and extending therebetween a heavy angle bar 40. Each of the plates 10^b and 10^c has secured to its rear side a frame 41 comprising a curved angle bar 41^a riveted to said plates. The frame 41 which is substantially triangular, has a lower rearwardly extending arm 41^b having a recess in its outer end in which is disposed a nut block or member 42. The frame 41 has pivoted to its upper end a rearwardly extending bar 43 also having an apertured lug 43^a at its rear end. The bar 43 also has a vertically extending hub 43^b bored to receive the upper end of screw shaft 44 extending therethrough and downwardly into the nut 42. The shaft 44 has a collar 45 pinned intermediate its ends, between which and washer 46 engaging the lower side of the hub 43^b is disposed a compression coil spring 47. The frames 41 are connected by cross bars 47^a as shown in Fig. 1. The member 38 has at its front portion in the rear of the plates 10^b and 10^c a pair of upwardly extending lugs 38^b between which is pivoted the front end of a lever 47^b extending rearwardly and upwardly and having its upper rear end embraced by a nut

member 48[a] through which passes a screw 49, which screw passes through lever 47[b] and extends upwardly through a bearing member 50 secured to the rear of plates 10[b] and 10[c], said screw 49 having a squared upper end projecting through an aperture 10[f] in the front of the plow, adapted to receive a suitable socket wrench. A shoe comprising a plate 51 is provided, which has its front and rear ends curved upwardly and has a post 52 pivoted in lugs adjacent its central portion, the upper end of which post is embraced by the lever 47[b] intermediate the ends thereof. The plate 51 has journaled therein a plurality of rollers 53 carried on shafts 54 journaled in lugs on said plate, said rollers extending through openings in said plate, and adapted to engage the ground or supporting surface for the plow.

In operation, the plow will be propelled by a tractor or other means having members connected to the lugs 38[a] and 43[c]. The shaft 23 as stated will be driven from the motor of the automobile and the shaft 19 will thus be driven and will drive the propelling means 26 in the direction indicated by the arrows. The plow will be moved through the snow and the snow will be moved laterally and rearwardly by the curved mold boards and will be delivered to the propellers 26. These propellers are driven at high speed and the snow will be deflected by them and propelled upwardly at the rear of the plates 11 and into the chute 13. With the plow disclosed in applicant's prior Patent, 1,524,518, the snow is simply discharged at each side of the roadway. It is sometimes desired to load the snow and remove the snow, as when the snow is cleared from city streets. It has also been found in practice that if a strong wind is blowing across the road, it is difficult to discharge the snow laterally to one side of the road with the plow shown in applicant's prior patent. The members 15 are thus provided, which will direct the snow in different directions. When the member 15 is disposed as shown in full lines in Fig. 3, the snow will be deflected to the outer side or the same side of the plow on which member 15 is disposed. If the member 15 is disposed as shown in dotted lines in Fig. 3, the snow will be directed across the top of the plow to the other side of the road. If a wind be blowing across the road, therefore, and across the plow, the member 15 can be disposed as shown in the dotted lines and the snow will thus be effectively delivered at the opposite side of the road and the opposite side of the plow from that on which the member 15 is mounted. At this time the member 15 on the other chute 15 will be turned in the same direction. The members 15 can also be used when it is desired to load the snow and will direct the snow to one side in a comparatively narrow stream so that a wagon or truck can drive alongside of the plow and receive the snow.

As the plow is propelled along there is considerable vibration of the front end as the plow moves over the inequalities in the road surface, and some of the shock of this vibration will be absorbed by the spring 47. It will be noted that the link 43 cannot freely swing downwardly about its pivot, owing to the fact that the shaft 44 extends through the hub 43[b]. The shaft 44 can be turned by the application of a wrench to its upper end to bring the lug 43 and arm 41[b] closer together or farther apart. As the lug 43[a] will be fixed by attachment to the tractor, this action will tend to respectively raise or lower the member 41[b] and frame 41 to elevate or lower the rear end of the plow. The pusher bars 39 will be connected to a bar (not shown) extending transversely of the tractor, while the members connected to lugs 43[a] extend to the tractor frame.

It is sometimes desired to leave some snow on the road and the front end of the plow can be elevated as desired by turning of the screw 49 by a suitable wrench. The front end of the spring 47[b] and plow is raised with the shoe or plate 51 acting as a base of reaction, and the front end of the plow can be held elevated as desired.

By shifting the levers 35, either shaft 19 can be connected or disconnected from its propeller 26. When the shafts 19 are moved endwise so that the angular portion 19[a] moves out of registry with the member 30, the propeller will not be driven. The plow can thus be quickly changed to operate with one or both of the propellers 26 and both propellers can be thrown out of action if desired.

From the above description it is seen that applicant has provided a simple and efficient snow plow and one which will quickly remove the snow and effectively dispose of the same. The plow is constructed of comparatively few parts and these can be simply and ruggedly made so that the plow will endure the heavy duty to which it is subjected. The device has been amply demonstrated in actual practice and found to be very successful and efficient.

It will, of course, be understood that various changes may be made in the form, details, arrangement and proportions of the parts, without departing from the scope of applicant's invention, which, generally stated, consists in a device capable of carrying out the objects above set forth, in the novel parts and combinations of parts disclosed and defined in the appended claims.

What is claimed is:—

1. A snow plow having in combination, a prow portion having a central rearwardly inclined edge extending upwardly at an angle of less than 45 degrees to the vertical, a curved mold board extending laterally and rear-

wardly at each side of said edge, a semi-cylindrical casing at the outer end of each mold board and substantially continuous therewith, having its outer side closed, a conduit extending upwardly from each of said casings having an open upper end, rotary snow propelling means adjacent the outer end of each mold board and disposed in said casing for receiving the snow from said mold board and propelling the same upwardly in said conduits and pivoted swinging means at the top of each conduit for directing the snow in opposite directions.

2. A snow plow having in combination, a front prow portion having a central upwardly and rearwardly inclined rectilinear edge, a curved mold board extending laterally and rearwardly from each side of said edge and terminating in a semi-cylindrical edge disposed in a vertical plane parallel to the longitudinal center line of said plow, a semi-cylindrical casing at the outer end of each mold board extending continuous therewith, a vertical plate at the outer side of each of said casings, shafts extending transversely of said mold boards and casings, and concentric therewith, rotary means comprising substantially radial extending trough-shaped snow propellers carried by each shaft and disposed adjacent the outer end of said mold boards and in said casings, conduits extending vertically from each of said casings open at their upper ends and adjustable swinging deflecting plates at the top of said conduits for directing the snow to either side of said plow.

3. A snow plow having in combination, a front prow portion, a laterally and rearwardly extending mold board at each side of said portion, end walls at the outer sides of said plow, conduits extending upwardly above said propelling means and having open upper ends, rotary snow propelling means adjacent the outer end of each mold board for receiving snow therefrom and directing the same upwardly in said conduits, and "swinging" segmental trough-shaped members pivoted intermediate their ends above said conduits adjustable to direct the snow to either side of said plow.

4. A snow plow having in combination, a mold board extending laterally and rearwardly at each side thereof, a rotary snow propeller rotatable about a horizontal axis and held from lateral movement adjacent the outer end of each of the mold boards, a driving shaft for each of said propellers adapted to be connected and disconnected to its respective propeller by a longitudinal sliding movement, means for moving each shaft longitudinally, a gear connected to said shafts for driving the same, a pinion meshing with said gear and a shaft for driving said pinion projecting at the rear of the plow and adapted to be connected to the motor shaft of an automobile.

5. The structure set forth in claim 4, each of said propellers having a central hub, an angular socket in said hub, an angular portion on each of said shafts adapted to move into and out of engagement with said angular socket to connect or disconnect said shaft and propeller.

6. A snow plow having in combination, laterally and rearwardly extending mold boards meeting in a central front edge, a member for each mold board supporting the lower edge thereof and having means at its rear end adapted to be connected to a pusher member, a bar connecting said members, a frame connected to the rear of each mold board and engaging said bar, a link pivoted to the upper end of each frame extending rearwardly therefrom and having means at its rear end adapted to be connected to a pusher member, said frame having an arm extending rearwardly at its lower portion and means for moving the rear end of said link toward and from the rear end of said arm when said link is connected to said pusher member and held from vertical movement thereby to raise and lower the rear end of said plow.

7. The structure set forth in claim 6, said last mentioned means comprising a screw shaft extending through a bore in said link and engaging the nut held in the said arm.

8. A snow plow having in combination, laterally and rearwardly extending mold boards diverging from a central front edge, means at the rear of each mold board and adjacent their outer ends and bottom edges adapted to be connected to a pusher member, a frame secured to the rear of each mold board and having means extending outwardly at the top thereof adapted to be secured to a pusher member and resilient means between said last mentioned means and the bottom of said frame for absorbing the vibration of said plow as it moves over the road.

9. A snow plow having in combination, a front prow portion and mold boards extending laterally and rearwardly therefrom, a shoe having a ground engaging means disposed in the rear of said prow, a lever pivoted at one end to said prow, extending rearwardly, a support for said lever on said shoe, and adjustable means connected to the other end of said lever to move the same to raise and lower said prow portion.

10. The structure set forth in claim 9, and a roller revolubly carried by said shoe at each side of said support and constituting said ground engaging means.

11. A snow plow having in combination, a prow portion having a central upwardly and rearwardly inclined edge, a curved mold board extending laterally and rearwardly at the side of said edge, a semi-cylindrical casing at the outer end of each mold board and

continuous therewith having its outer side closed, a conduit extending from said casing having an open outer end, rotary snow propelling means adjacent the outer end of said mold board and disposed in said casing for receiving the snow from said mold board, and propelling it through said conduit and means at the outer end of said conduit for directing said snow laterally.

12. A snow plow having in combination a rotatable snow propelling means, comprising a plurality of members trough-shaped in cross section, said members extending radially and tapering in depth toward their outer ends, an annular member at one side of said members to which they are respectively connected, and means at the other side of said members to which they are connected at said latter side.

13. The structure set forth in claim 12, and a bracket disposed in the rear of each of said trough-shaped members shaped to embrace the same and secured thereto, said bracket being secured to said annular member.

14. A snow plow having in combination, a laterally extending mould board, a substantially semi-cylindrical chamber at the outer end of said mould board to which the snow is moved by said mould board, said chamber having its outer end closed, a conduit extending upward from the top of said chamber, a rotary member disposed in said chamber with its axis substantially coincident with that of said chamber, said member having curved blades adapted to engage the snow at the front and direct it upwardly substantially tangentially into said conduit.

15. A snow plow having in combination, a laterally extending mould board, a substantially semi-cylindrical chamber at the outer end of said mould board to which the snow is moved by said mould board, said chamber having its outer end closed, a conduit extending upward from the top of said chamber, a rotary member disposed in said chamber with its axis substantially coincident with that of said chamber, said member having substantially lateral trough shaped blades, said blades having advanced edges at one side adapted to engage the snow at the front of said member and direct the same upwardly into said conduit.

16. A snow plow having in combination laterally and rearwardly extending mold boards meeting in a central front edge, a frame rigidly secured to the rear side of each mold board at an intermediate point thereon, said frame having an arm rigid therewith projecting rearwardly from its lower portion, an arm pivoted to the upper portion of said frame and extending rearwardly therefrom adapted to be connected to a pusher member, and means extending between said arms for relatively moving the same.

17. A snow plow having in combination, a front prow portion having a central upwardly and rearwardly inclined rectilinear edge, a curved mold board extending laterally and rearwardly from each side of said edge, a semi-cylindrical casing at the outer end of each mold board extending continuous therewith, a vertical plate at the outer side of each of said casings, shafts extending transversely of said mold boards and casings and concentric therewith, rotary snow propelling means carried by each shaft and disposed in said casings and conduits extending vertically from each of said casings open at their upper ends through which snow is discharged by said propelling means.

In testimony whereof I affix my signature.

JOHN O. JOHNSON.